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## DESCRIPTION

CLEANING GASTECHNICAL FIELD

5 The present invention relates to a cleaning gas  
suitable for use in production of semiconductors.

BACKGROUND ART

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B1  
10 Perfluoro compounds such as  $CF_4$ ,  $C_2F_6$ ,  $C_4F_8$   
(perfluorocyclobutane) and  $SF_6$  are used in large amounts  
as cleaning gases for plasma CVD chambers in production  
of semiconductors. Since the perfluoro compounds are  
stable and have long atmospheric lifetimes and high  
infrared absorbency, they have extremely high global  
warming potential (GWP) as compared with carbonic acid  
gas.  $CF_4$  is 6300 times,  $C_2F_6$  is 1250 times,  $C_4F_8$  is 9100  
15 times and  $SF_6$  is 24900 times as high as carbonic acid gas  
in GWP. Therefore, development of a substitute gas  
having a low global warming potential is an urgent task.

20 An object of this invention is to provide a  
substitute gas which is suitable for use as a cleaning  
gas for plasma CVD chambers in production of  
semiconductors, the gas having a low global warming  
effect.

DISCLOSURE OF INVENTION

25 The present invention provides the following  
cleaning gas and cleaning method:

1. A chamber cleaning gas comprising at least one gas selected from the group consisting of  $\text{CF}_3\text{CF}=\text{CF}_2$ ,  $\text{CF}_3\text{CF}-\text{CF}_2$  and  $\text{CF}_3\text{C}=\text{O}$ .

5 2. A chamber cleaning method comprising cleaning a plasma CVD chamber of a semiconductor integrated circuit production device using at least one gas selected from the group consisting of  $\text{CF}_3\text{CF}=\text{CF}_2$ ,  $\text{CF}_3\text{CF}-\text{CF}_2$  and  $\text{CF}_3\text{C}=\text{O}$ .

10 As the chamber cleaning gas of the invention, any of  $\text{CF}_3\text{CF}=\text{CF}_2$ ,  $\text{CF}_3\text{CF}-\text{CF}_2$  and  $\text{CF}_3\text{C}=\text{O}$  can be used; they can be used singly or in combination of two or more. The chamber cleaning gas of the invention may be used in  
15 combination with a monomer gas such as He, Ne, Ar,  $\text{H}_2$ ,  $\text{N}_2$  or  $\text{O}_2$ .

There is no limitation on materials of the chamber. The chamber may be made of known materials such as stainless steel or aluminum alloy. Without adversely  
20 affecting the materials of the chamber, the chamber cleaning gas of the invention can quickly remove reaction byproducts attached to the wall of the chamber.

Examples of byproducts removed by the cleaning method of the invention are silicon, polysilicon,  
25 tungsten, titanium and their oxides, nitrides and

carbides.

As the chamber cleaning conditions of the invention, conventional conditions using perfluoro compounds may be used as they are.

5 All the three kinds of chamber cleaning gases of the invention have satisfactory levels of properties so that they can be used as substitutes for conventionally used chamber cleaning gasses, namely,  $\text{CF}_4$ ,  $\text{C}_2\text{F}_6$  and  $\text{SF}_6$ . Moreover, the gases of the invention have much lower  
10 global warming potential than  $\text{CF}_4$ ,  $\text{C}_2\text{F}_6$  and  $\text{SF}_6$ .

For example, when used under known chamber cleaning conditions (pressure = 100 m Torr; input high-frequency power = 300 W; gas flow rate = 50 cc/min) for 30 minutes,  $\text{CF}_3\text{CF}=\text{CF}_2$  of the invention fully and quickly  
15 removes attached byproducts from the chamber without damaging the chamber. Thus  $\text{CF}_3\text{CF}=\text{CF}_2$  of the invention is suitable for use in practice.

When  $\text{CF}_3\text{CF}(\text{O})\text{CF}_2$  is used in place of  $\text{CF}_3\text{CF}=\text{CF}_2$   
20 under the above conditions,  $\text{CF}_3\text{CF}(\text{O})\text{CF}_2$  fully and quickly removes attached byproducts from the chamber without damaging the chamber, thus being usable in practice.

Similarly, when  $\text{CF}_3\text{C}(\text{O})\text{CF}_3$  is used in place of  
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$\text{CF}_3\text{CF}=\text{CF}_2$ ,  $\text{CF}_3\overset{\text{CF}_3}{\underset{|}{\text{C}}}=\text{O}$  fully and quickly removes attached  
byproducts from the chamber without damaging the chamber,  
thus being usable in practice.

- 5           According to the present invention, chamber  
cleaning can be done satisfactorily, without using any of  
 $\text{CF}_4$ ,  $\text{C}_2\text{F}_6$ ,  $\text{C}_4\text{F}_8$  and  $\text{SF}_6$  that have extremely high global  
warming potential as compared with carbonic acid gas.